

Four new species of *Stylidium* (Stylidiaceae) from the Kimberley region of Western Australia

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Abstract

Barrett, R.L., Barrett, M.D., Kenneally, K.F. & Lowrie, A. Four new species of *Stylidium* (Stylidiaceae) from the Kimberley region of Western Australia. *Nuytsia* 26: 127–141 (2015). *Stylidium latrodectus* R.L.Barrett, M.D.Barrett & Lowrie, *S. pindanicum* R.L.Barrett, *S. saintpaulioides* R.L.Barrett, M.D.Barrett & Lowrie and *S. willingii* R.L.Barrett, Kenneally & Lowrie are described as new species from the Kimberley region of Western Australia. All species are illustrated and modified keys are presented.

Introduction

Four new species of *Stylidium* Sw. from the Kimberley region of northern Australia are described. *Stylidium latrodectus* R.L.Barrett, M.D.Barrett & Lowrie and *S. willingii* R.L.Barrett, Kenneally & Lowrie are reasonably widespread between Charnley River Station and Kalumburu. *Stylidium saintpaulioides* R.L.Barrett, M.D.Barrett & Lowrie is restricted in distribution between Theda Station, Kalumburu and the Lawley River. *Stylidium pindanicum* R.L.Barrett is restricted to the Dampier Botanical District.

Stylidium has been reviewed for northern Australia by Bean (1999, 2000, 2010), following the description of a series of new species by Lowrie and Kenneally (1996, 1997, 1998). Prior to this, the only available works on Kimberley triggerplants were those of Erickson (1958) and Wheeler (1992), both of which included less than half the number of taxa now known to occur in the region. This paper brings together the combined experience of four authors who began working together in 1992 to ‘conquer new worlds’ (see Erickson 1958: 172). While great advances have been made in the ‘new world’ of tropical triggerplants, numerous new species have come to light in recent decades that await formal recognition and description. Many of these taxa are short-lived ephemerals that grow on shallow sandy flats on sandstone in the north-west Kimberley in habitats that quickly dry out at the end of the wet season, meaning there is a very narrow seasonal window for their discovery and collection.

Methods

Descriptions are based on herbarium specimens. All new species described here have been examined in the field by at least the first author. Specimens have been examined at BM, CANB, K, MEL, NSW and PERTH. Seeds and pollen grains were mounted on stubs using double-sided or carbon tape with conductive carbon paint, coated with gold using an EMITECH K550X Sputter Coater and imaged at high vacuum and high voltage (15 KV_a) using a Jeol JCM 6000 NeoScope bench-top Scanning Electron Microscope at Kings Park and Botanic Garden.

Taxonomy

Stylidium latroductus R.L.Barrett, M.D.Barrett & Lowrie, *sp. nov.*

Type: Drysdale River National Park, Western Australia [precise locality withheld for conservation reasons], 29 April 2008, R.L. Barrett & M.D. Barrett RLB 4862 (*holo:* PERTH 08615969; *iso:* DNA, MEL).

Stylidium longicornu auct. non Carlquist: J.R. Wheeler in J.R. Wheeler (ed.), *Fl. Kimberley Reg.*, p. 881, Figure 270e (1992).

A slender, fibrous-rooted annual *herb* 8–34 cm high with translucent white stems, 1–4 mm long. Glandular *hairs* 0.15–0.2 mm long; glands globose, red. *Leaves* 9–16 per plant, arranged in a flat basal rosette, sessile, obovate to spatulate, 2–10 mm long, 1–5 mm wide, flat in section, glabrous; apex obtuse to subacute; base broadly attenuate; margin flat. *Scapes* 1(–3) per plant, 8–34 cm long, 0.7–1.1 mm wide, sparsely to densely glandular-hairy; sterile bracts absent. *Inflorescence* determinate, branches monochasially or dichasially cymose or with flowers solitary, sparsely glandular-hairy; bracts and bracteoles ovate to cordate, 1–2 mm long, 0.5–1.0 mm wide, glandular-hairy; apex acute; pedicels 5–25 mm long, glandular-hairy. *Hypanthium* globose, 1–2.5 mm long, 2–3 mm diam., glandular-hairy. *Sepals* free, narrowly oblong to narrowly elliptic, 2–3 mm long, glandular-hairy, apex obtuse, anterior pair horizontal and splayed outwards under the anterior corolla lobes; middle pair erect; posterior sepal horizontal. *Corolla* tube 1–1.5 mm long, with a pink *nectary spur* 2–5 mm long and cradled by posterior sepal; throat pink or white; lobes entirely dark pink to red on face or broadly dark red around the central veins with narrow, pale margins, dark pink to red on reverse, sometimes with darker pink veins, vertically-paired, glabrous; anterior (lower) lobes irregularly obovate, 3–4.5 mm long, 1.3–2.5 mm wide, apex emarginate; posterior (upper) lobes obovate, 1.1–2.5 mm long, 1.5–2.0 mm wide, apex obtuse and irregularly crenate. *Paracorolla* appendages very small. *Labellum* positioned below the sinus of the anterior corolla lobes, cream, concave, obovate, *c.* 1.5 mm long, *c.* 1 mm wide, glabrous, apex irregularly serrate. *Column* *c.* 2 mm long (the erect, non-sensitive basal portion *c.* 0.5 mm long, the sensitive cunabulum *c.* 1.5 mm long), without appendages, striking from below; corona absent; stigma stipitate between the anthers, *c.* 1 mm long, apex brush-like; anthers *c.* 0.5 mm long. *Capsule* globose, 2–2.5 mm diam. *Seeds* pale brown, ± compressed-ovoid, 0.17–0.21 mm long, 0.12–0.15 mm diam., finely sculptured. (Figures 1, 2A)

Diagnostic characters. *Leaves* small, basal. *Flowers* with a nectary spur, face of corolla pink, reverse dark pink to red. *Paracorolla* appendages very small. *Column* without appendages. *Hypanthium* globose.

Other specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 29 June 2003, M.D. Barrett & L.W. Sweedman MDB 1478 (PERTH); 1 June 1993, D. Dureau 130

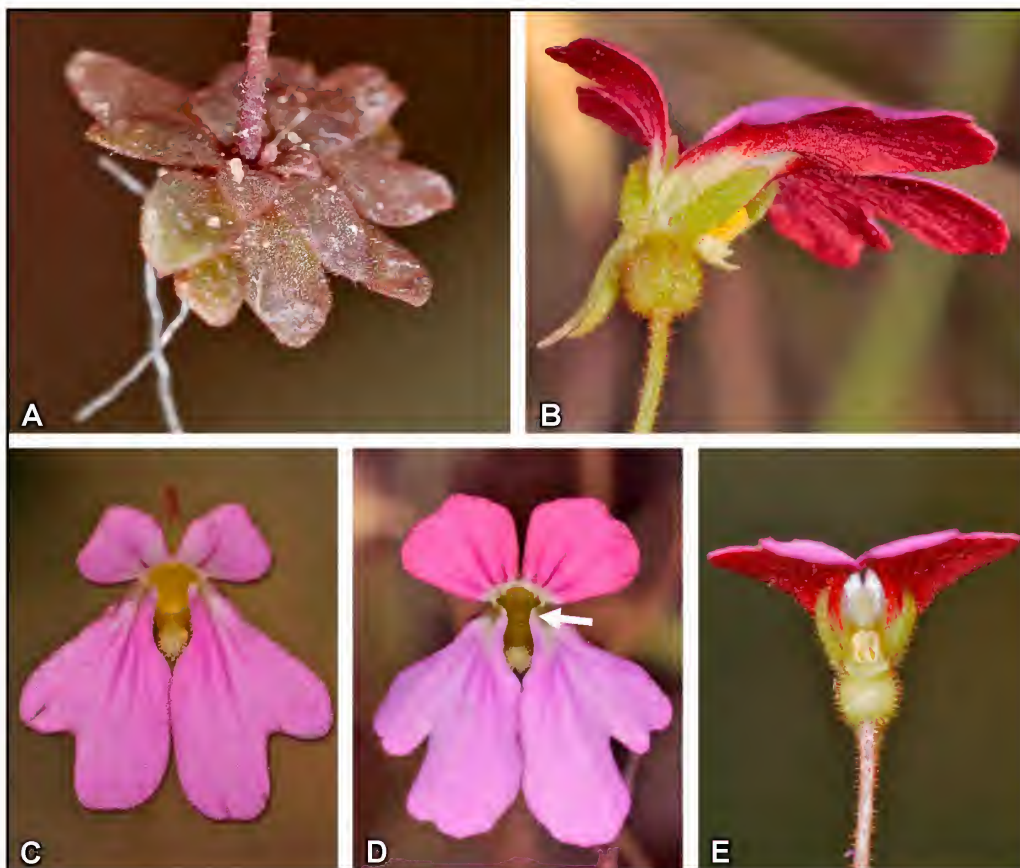


Figure 1. *Stylidium latrodectus*. A – leaf rosette; B – lateral view of flower showing red back to corolla, reflexed sepal, corolla spur and lobed labellum; C – uniformly pink flower; D – bicoloured flower - note constriction near sinus on anterior (lower) corolla lobes, indicated by arrow; E – front of flower from below showing column and labellum. Images from Theda Station (not vouchered; A, C) and R.L. Barrett & M.D. Barrett RLB 4862 (B, D, E). Photographs by M.D. Barrett (A, C); R.L. Barrett (B, D, E).

(AD *n.v.*, PERTH); 16 Aug. 1975, A.S. George 13914 (CANB, PERTH); 6 Aug. 1975, K.F. Kenneally 4012 (PERTH); 6 Aug. 1975, K.F. Kenneally 4030 (CANB, K *n.v.*, PERTH); 24 June 1993, A. Lowrie 765 (PERTH); 25 June 1993, A. Lowrie 776 (PERTH).

Phenology. Flowering and fruiting recorded from April to August.

Distribution and habitat. Recorded between Beverley Springs [Charnley River] Station, the Mitchell Plateau and Drysdale River National Park in Western Australia. Grows on damp sand, usually on sandstone, on sand flats or beside creeks in herbfields.

Conservation status. *Stylidium latrodectus* is to be listed as Priority Two under Department of Parks and Wildlife Conservation Codes for Western Australian Flora (A. Jones pers. comm.).

Etymology. The epithet is from the genus *Latrodectus* Walckenaer (Araneae; Theridiidae), containing the redback spider, in reference to the dark pink to red back of the corolla that readily distinguishes this species from its nearest relative, *S. longicornu* Carlquist. The epithet is formed as a noun in apposition.

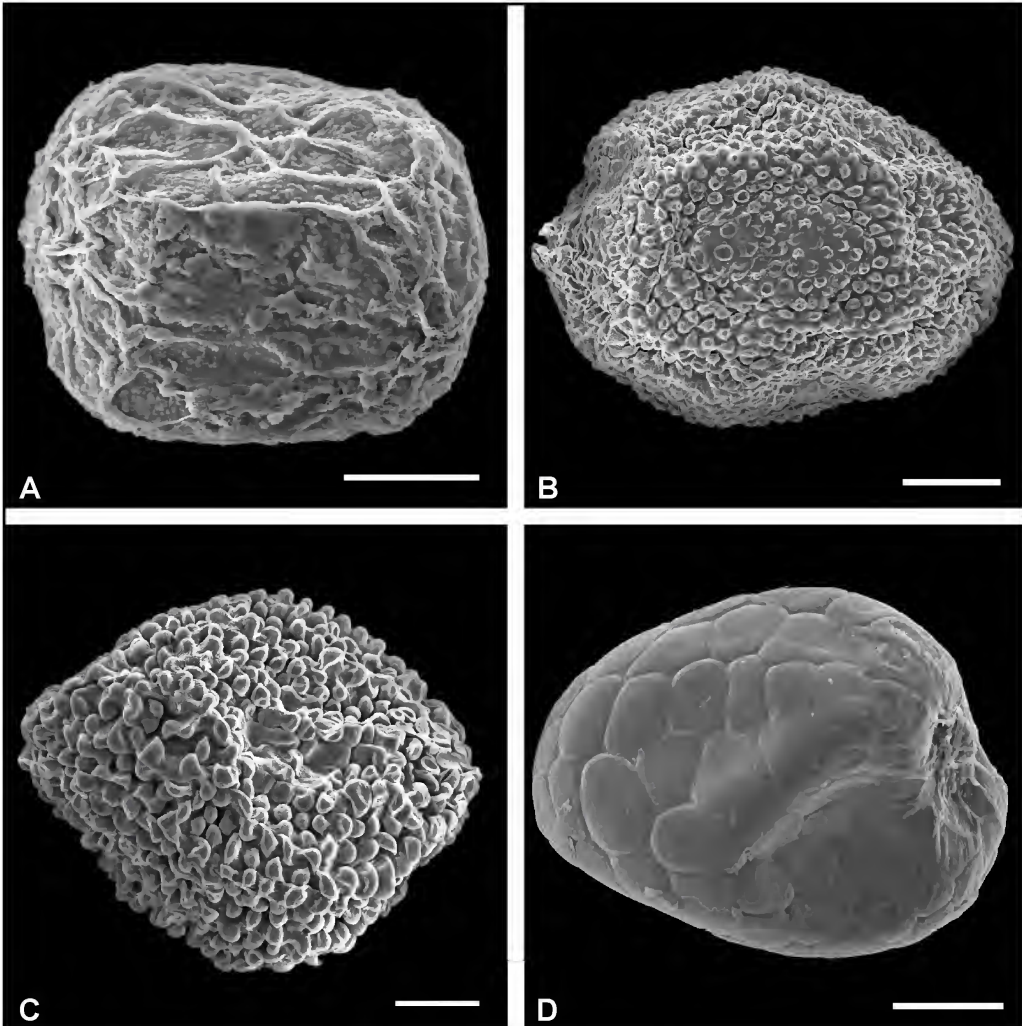


Figure 2. SEM images of *Styloidium* seeds. A – *S. latroductus*; B – *S. pindanicum*; C – *S. saintpaulioides*; D – *S. willingii*. Images from D. Dureau 130 (A), R.L. Barrett & M. Henson RLB 7072 (B), M.D. Barrett & R.L. Barrett MDB 2917 (C) and F. Lullfitz 6052 (D). Scale bars = 50 μ m. Images by R.L. Barrett (A, B, D); M.D. Barrett (C).

Notes. *Styloidium latroductus* has a close affinity with *S. longicornu* and *S. diceratum* Lowrie & Kenneally, the latter occurring within the range of *S. latroductus*. These three taxa have not been found intermixed at any sites, but are known from similar habitats. *Styloidium latroductus* is easily distinguished from *S. longicornu* by the red-backed corolla. The flowers of *S. longicornu* have a subtly different corolla shape (the secondary lobing being broader and more rounded on *S. latroductus*). Carlquist (1979) states in his description of *S. longicornu* ‘throat without appendages’ and examination of herbarium material and field studies confirm this. *Styloidium latroductus* usually has very reduced paracorolla lobes that are evident as small ridges or projections near the base of the posterior lobes. It also has a lobe-like structure formed at the sinus on the anterior corolla lobes that increases the constriction of the anterior lobes around the throat, presumably serving to guide pollinators. *Styloidium diceratum* tends to have a longer nectary spur (4.5–6.5 mm and much longer than the corolla vs 2–5 mm and much shorter than the corolla in *S. latroductus*), has two horn-like appendages on the side of the column, and an orange corolla face.

The Western Australian collections previously assigned to *S. longicornu* belong to *S. latroductus*. *Stylidium longicornu* is known from the Arnhem Land Plateau in the Northern Territory, extending south-east to far north-west Queensland. Prior to the description of *S. longicornu*, specimens of *S. diceratum*, *S. latroductus* and *S. longicornu* were assigned to *S. ceratophorum* O.Schwarz due to the presence of a nectary spur (e.g. George & Kenneally 1975, 1977).

The dark colouration on the reverse of the corolla on this and other species appears to be a factor influencing flower temperature; the flowers of many tropical *Stylidium* species close overnight, opening, and with the column becoming sensitive, only when there is sufficient light and heat available (RLB, pers. obs.). The dark colouration appears to promote more rapid warming of the flowers in the morning relative to co-occurring species with pale corollas and hence flowers are more likely to be receptive to pollination at the time of peak pollinator activity (usually around 10 am; RLB & AL, pers. obs.).

The vernacular name of Red-backed Triggerplant is recommended.

Stylidium latroductus can be included in the key of Lowrie and Kenneally (1998) by modifying and adding the following couplets:

9. Plants mostly 5–9 cm tall; posterior corolla lobes cuneate, apex tridentate; nectary spur shorter than the posterior sepal **S. aceratum**
- 9: Plants mostly 10–25 cm tall; posterior corolla lobes obovate, apex crenate or entire; nectary spur longer than the posterior sepal **10**
10. Reverse of corolla dark pink to red; anterior corolla lobes with a constriction at the sinus; small paracorolla lobes present, sometimes reduced..... **S. latroductus**
- 10: Reverse of corolla white or pale pink; anterior corolla lobes without a constriction at the sinus; paracorolla lobes absent..... **S. longicornu**

Stylidium pindanicum* R.L.Barrett, *sp. nov.

Type: Cape Leveque Road, Dampier Peninsula, north-east of Broome, Western Australia [precise locality withheld for conservation reasons], 4 May 2011, *R.L. Barrett & M. Henson* RLB 7072 (*holo:* PERTH 08613478; *iso:* AD, BRI, CANB, DNA, K, MEL, NSW).

Illustration. K.F. Kenneally, D. Choules Edinger & T. Willing, *Broome and Beyond*, p. 191 (1996), as *S. leptorrhizum*.

Herbaceous *annual*, 12–32 cm high, with non- or 1-branched stems 13–30 mm long, base not thickened. Glandular *hairs* 0.2–0.3 mm long; glands ellipsoid, red. *Leaves* numerous, 14–49 per rosette, mostly arranged in a terminal rosette with some scattered below along stems to near ground level, with petioles 5–16(–22) mm long; lamina oblanceolate, spatulate or occasionally elliptic with an attenuate base, 7–18 mm long, 2–8 mm wide, flat to canaliculate in section, sparsely glandular-hairy; apex acute to attenuate; base long-attenuate, grading into petiole; margin entire. *Scapes* 1–15 per plant, 7–33 cm long, 0.3–1.6 mm in diam., sparsely glandular-hairy; sterile bracts absent or occasionally 1, 2–2.5 mm long, 0.3 mm wide. *Inflorescences* determinate, monochasially or dichasially cymose, branches sparsely glandular-hairy; bracts linear or lanceolate, 1–4 mm long, glandular-hairy, apex acute; bracteoles absent; pedicels 5–12 mm long, glandular-hairy. *Hypanthium* obovoid to ellipsoid, 1.6–1.9 mm long, 0.5–0.6 mm wide, glandular-hairy. *Sepals* free, obovate to broadly oblong, 0.7–0.9 mm long, 0.4–0.6 mm wide, glandular-hairy, apex obtuse or acutely shortly notched at apex.

Corolla tube 1.4–2.0 mm long, with sinus on anterior side only, glandular-hairy at apex; *lobes* pink or mauve on face or anterior lobes almost white, pink with dark red mottling on reverse, vertically paired, glandular-hairy on reverse; anterior (upper) lobes 1.5–2.0 mm long, 1.1–1.7 mm wide, entire, apex obtuse; posterior (lower) lobes fused for half their length, 2.2–3.5 mm long, 1.1–1.8 mm wide, entire, apex obtuse. *Paracorolla* continuous, lobed, thin, glabrous, *c.* 0.1 or *c.* 0.4 mm high, lobes or appendages 4, dimorphic; central pair at the base of the anterior lobes *c.* 0.1 mm high, white, obtuse; 2 lobes at the base of the posterior lobes *c.* 0.4 mm high, white at base, pink above, flattened, broader at apex and deeply or unevenly notched, apices acute; glands absent. *Labellum* attached to outside of corolla tube at base of anterior sinus, waxy cream, ovate, 0.3–0.4 mm long, 0.15–0.2 mm wide, thick, obtuse or acute, glabrous, with a short terminal appendage to 0.05 mm long. *Column* 4.2–7 mm long, mostly of uniform width, a few glandular hairs towards the apex, cunabulum slightly broader with 2 distinct rows of thick, eglandular hairs on the sides, lateral lobes absent; corona absent; stigma sessile, entire; anthers *c.* 0.6 mm long; pollen tetracolpate, *c.* 30 µm long. *Capsule* ellipsoid, 3.5–4.5 mm long excluding sepals, 1.8–2.3 mm wide, without raised longitudinal ribs; halves detaching distally, not recurved. *Seeds* brown, globose or ellipsoid, 0.2–0.3 mm long, 0.2–0.25 mm diam., prominently and densely colliculate. (Figures 2B, 3, 4B)

Diagnostic characters. *Leaves* slender, numerous, 14–49 held in a terminal rosette with a small number of leaves scattered on the stem below to near ground level, petioles 5–16(–22) mm long; blade 7–18 mm long, 2–8 mm wide. *Inflorescence* paniculate. *Paracorolla* with 4 dimorphic lobes or appendages, 2 central lobes *c.* 0.1 mm high, obtuse, white, 2 lateral lobes *c.* 0.4 mm high, white at base, pink above, flattened, broader at apex and deeply or unevenly notched, apices acute.

Other specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 7 May 2011, *R.L. Barrett* RLB 7082 (BM *n.v.*, PERTH); 23 Sep. 1989, *B.J. Carter* 427 (PERTH); 5 May 1991, *B.J. Carter* 459 (DNA *n.v.*, PERTH); 29 Aug. 1993, *B.J. Carter* 667 (PERTH); 3 July 2001, *K. Coate* 640 (PERTH); 20 Aug. 1976, *K.F. Kenneally* 5777 (CANB, PERTH); 19 June 1984, *K.F. Kenneally* 9060 (DNA *n.v.*, PERTH); 22 Aug. 1985, *K.F. Kenneally* 9469 (PERTH); 29 June 1993, *K.F. Kenneally* 11378 (PERTH); 29 June 1993, *K.F. Kenneally* 11381 (DNA *n.v.*, PERTH); 29 June 1993, *K.F. Kenneally* 11387 (PERTH); 27 May 1993, *A.A. Mitchell* 3126 (PERTH); May 1967, *Y. Power s.n.* (PERTH); 11 June 2006, *L.S.J. Sweedman* 6843 (KPBG, PERTH).

Phenology. Flowering and fruiting recorded from May to August.

Distribution and habitat. Restricted to seasonally damp areas over pindan sands on the Dampier Peninsula, east to near Fitzroy Crossing, growing with *Chrysopogon fallax*, *Cleome tetrandra s.l.*, *Eucalyptus tectifera*, *Mitrasacme* spp. and *Sorghum plumosum*.

Conservation status. *Stylidium pindanicum* is to be listed as Priority Three under Department of Parks and Wildlife Conservation Codes for Western Australian Flora (A. Jones pers. comm.).

Etymology. The epithet refers to the pindan sandplains of the Dampier Botanical District where this species is found.

Notes. This species was illustrated in *Broome and beyond* (Kenneally *et al.* 1996) as *S. leptorrhizum* F.Muell., the application of which was at that stage confused with *S. semipartitum* F.Muell. *Stylidium pindanicum* is related to both of these species, differing in the position of the leafy rosette (terminal, but on average the stem is much shorter than in *S. semipartitum*, so the rosette is held close to the



Figure 3. *Stylidium pindanicum*. A – habitat at type locality; B – habit; C – sparsely hairy leaves; D – leafy rosette showing leaves spread along the stem; E – flower with reflexed column showing marginal hairs on cunabulum, glossy labellum on corolla tube and red flecks on reverse of corolla; F, G – corolla face with small, white, central paracorolla lobes and pink, spreading, lateral paracorolla lobes - note red, thickened margin to the cunabulum. Images from R.L. Barrett & M. Henson RLB 7072. Photographs by R.L. Barrett

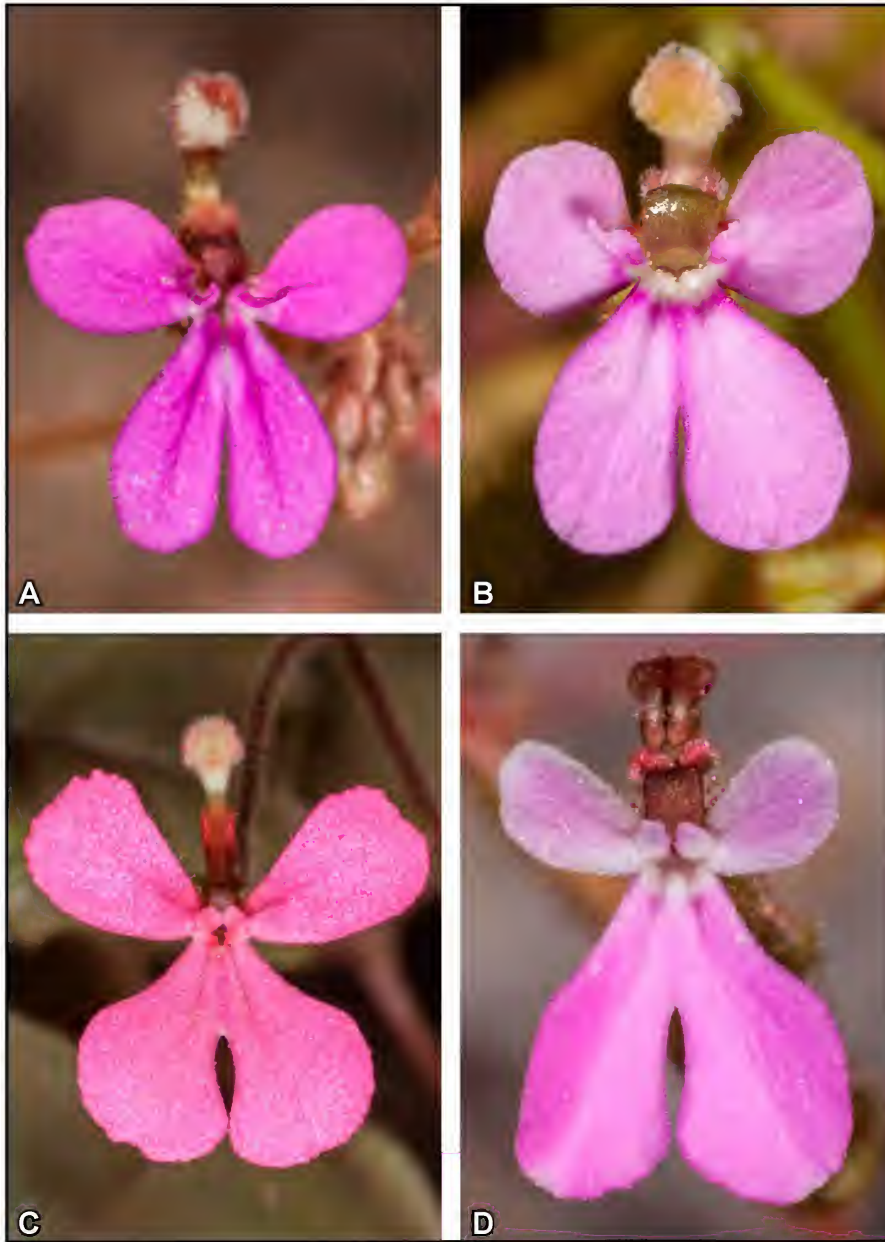


Figure 4. Comparative images of the corolla face of species in the *Stylidium leptorrhizum* group. A – *S. leptorrhizum*; B – *S. pindanicum*; C – *S. saintpaulioides*; D – *S. semipartitum*. Images from R.L. Barrett RLB 7362 (A), R.L. Barrett & M. Henson RLB 7072 (B), M.D. Barrett & R.L. Barrett MDB 2917 (C) and Phillips Range (not vouchered; D). Photographs by R.L. Barrett.

ground), slender leaves that are more sparsely hairy and the arrangement of the paracorolla. These taxa can be separated using leaf characteristics visible on herbarium specimens. *Stylidium saintpaulioides*, described below, is also part of this species group and the key features distinguishing these four species are presented in Table 1.

The application of the name *S. semipartitum* has been confused for most of its history, having been included under *S. leptorrhizum* by Bentham (1868). Bean (1999) correctly assigned the two names, but did not examine the type of *S. semipartitum* which was on loan to PERTH at the time of his studies, basing his conclusions on the description in Mueller (1859). The type of *S. semipartitum* is a collection by F. Mueller from the Victoria River, Northern Territory (K 000741766). The two plants on the type sheet have distinct, compact rosettes of 10–20 leaves concentrated at the stem apex. The leaves have long, distinct petioles and narrowly ovate to ovate laminas with more or less obtuse apices. The inflorescences of *S. semipartitum* are few-branched and have a sparse appearance. These features contrast strongly with the slender, acute to attenuate leaves and more-branched, denser inflorescences of *S. pindanicum*.

The vernacular name of Pindan Triggerplant is recommended.

Table 1. Key distinguishing features for *Stylidium leptorrhizum*, *S. pindanicum*, *S. saintpaulioides* and *S. semipartitum*.

	<i>S. leptorrhizum</i>	<i>S. pindanicum</i>	<i>S. saintpaulioides</i>	<i>S. semipartitum</i>
Stem length	2–6 mm	13–30 mm	35–160 mm	(16–)23–64 mm
Leaf arrangement	Basal	Terminal, and cauline, density reduced below	Terminal, a few leaves scattered below	Terminal, a few leaves scattered below
Leaf shape	Oblanceolate or elliptic, base cuneate	Oblanceolate, spathulate or occasionally elliptic, base attenuate	Broadly obovate, base usually deeply cordate	Oblanceolate, elliptic or obovate, base obtuse or cuneate
Leaf indumentum	Glabrous	Sparsely glandular-hairy	Sparsely glandular-hairy (sometimes glabrous on blade)	Sparsely glandular-hairy
Petiole length	3–13 mm	5–16(–22) mm	12–56 mm	5–20(–28) mm
Corolla colour	Dark pink or mauve on face; pink, mottled dark red on reverse	Pink or mauve on face or anterior lobes almost white; pink, mottled dark red on reverse	Orange-pink on face; pale orange-pink on reverse	Pink to dark pink on face, anterior lobes sometimes white; white to pale pink on reverse
Corolla tube length	3–3.5 mm	1.4–2 mm	3.4–3.9 mm	2.2–2.7 mm
Anterior corolla lobes	2.8–4 × 1.8–2.5 mm, obtuse	1.5–2 × 1.1–1.7 mm, obtuse	2.7–3.7 × 1.2–1.3 mm, obtuse	1.5–3.5 × 0.6–1.9 mm, acute or obtuse
Posterior corolla lobes	3.2–5 × 1.2–3 mm	2.2–3.5 × 1.1–1.8 mm	3.5–5.3 × 1.5–1.8 mm	2.5–4.2 × 1.5–2.8 mm
Paracorolla appendages	2, both similar, acute or obtuse	4, dimorphic, acute or obtuse	4, dimorphic, acute or obtuse	2 or 4, dimorphic, acute or obtuse

The key provided by Bean (1999) can be adapted to include *S. pindanicum* and *S. saintpaulioides* by modifying and adding the following couplets:

17. Leaves glandular-hairy (at least on margins)..... 17A
 17: Leaves glabrous..... 18
 17A. Leaf bases usually distinctly cordate; corolla face orange-pink **S. saintpaulioides**
 17A: Leaf bases acute to cuneate, not cordate; corolla face pale to dark pink..... 17B
 17B. Stem 13–30 mm, rosette terminal but held close to the ground; leaf blade
 7–18 mm long, 2–8 mm wide, apex acute to attenuate..... **S. pindanicum**
 17B: Stem (16–)23–64 mm, rosette terminal and held well clear of the ground;
 leaf blade 6–30 mm long, 3–21 mm wide, apex obtuse to acute.....**S. semipartitum**

Stylidium saintpaulioides R.L.Barrett, M.D.Barrett & Lowrie, *sp. nov.*

Type: Lawley River National Park, Western Australia [precise locality withheld for conservation reasons], 29 March 2010, *M.D. Barrett & R.L. Barrett* MDB 2917 (*holo:* PERTH 08615217; *iso:* BRI, CANB, DNA, K, MEL).

Herbaceous *annual*, 11–40 cm high, with *stems* 35–160 mm long, base not thickened, sparsely glandular-hairy. Glandular *hairs* 0.3–0.5 mm long; glands ellipsoid, red. *Leaves* 10–16 per plant, mostly arranged in a terminal rosette with a few scattered along the stem, with petioles 12–56 mm long; lamina broadly obovate, 11–52 mm long, 8–34 mm wide, flat to shallowly convex in section, sparsely glandular-hairy or glabrous; apex obtuse; base usually deeply cordate, sometimes subcordate to attenuate in younger leaves; margin entire, sparsely glandular-hairy. *Scapes* 1–9 per plant, 5–22 cm long, 0.3–0.7 mm diam., sparsely glandular-hairy; sterile bracts absent. *Inflorescence* determinate; monochasially or dichasially cymose, branches glandular-hairy; bracts lanceolate, 1–2 mm long, glandular-hairy, apex acute; bracteoles absent; pedicels 14–25 mm long, glandular-hairy. *Hypanthium* ellipsoid, 2.9–4.6 mm long, 0.9–1.2 mm wide, glandular-hairy. *Sepals* free, deltate to ovate, 1.4–1.7 mm long, 0.5–0.7 mm wide, glandular-hairy, apex acute. *Corolla* tube 3.4–3.9 mm long, with sinus on anterior side only, glandular-hairy; lobes orange-pink on face, pale orange-pink on reverse, vertically paired, glandular-hairy; anterior (upper) lobes 2.7–3.7 mm long, 1.2–1.3 mm wide, entire, apex obtuse; posterior (lower) lobes fused for c. 1/3 their length, 3.5–5.3 mm long, 1.5–1.8 mm wide, entire, apex obtuse. *Paracorolla* discontinuous, lobed, thin, glabrous, c. 0.1 or 0.4 mm high, lobes or appendages 4, dimorphic; 2 at the base of the anterior lobes c. 0.4 mm high, pink to white, acute; 2 at the base of the posterior lobes c. 0.1 mm high, pink to white, obtuse; glands absent. *Labellum* attached to the outside of the corolla tube on the anterior sinus, ovate, reddish brown, 0.5–0.6 mm long, 0.2–0.3 mm wide, thick, obtuse, glabrous, terminal appendage absent. *Column* 6.0–7.1 mm long, of uniform width with 2 rows of squat glandular hairs on the cunabulum, without lateral lobes; corona absent; stigma sessile, entire; anthers c. 0.2 mm long. *Capsule* ellipsoid, 4.4–6.6 mm long excluding sepals, 1.6–2.9 mm wide, without raised longitudinal ribs; halves detaching distally, not recurved. *Seeds* reddish brown, globose or ellipsoid, 0.32–0.38 mm long, 0.30–0.36 mm wide, finely and densely colliculate. (Figures 2C, 4C, 5)

Diagnostic characters. Leaf bases usually deeply cordate. *Petioles* 12–56 mm long. *Corolla* tube 3.4–3.9 mm long. Anterior *corolla lobes* 2.7–3.7 mm long, 1.2–1.3 mm wide, entire, obtuse. Posterior *corolla lobes* 3.5–5.3 mm long, 1.5–1.8 mm wide.

Other specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 1 May 1985, *T.E.H. Aplin, R.J. Cranfield, B.L. Rye & J.R. Wheeler* 857 (PERTH); 12 Mar. 2014,



Figure 5. *Stylidium saintpaulioides*. A – habit under sandstone overhang with many open flowers; B – leaves with cordate bases; C – inflorescence showing reduced branching structure (relative to *S. semipartitum*) and many simultaneously open flowers; D – lateral view of flower showing calyx, labellum and orange-pink reverse of corolla lobes; E – oblique view of flower with reflexed column showing erect paracorolla lobes; F – flower with small, visiting fly - note prominent paracorolla lobes. Images from M.D. Barrett & R.L. Barrett MDB 2917. Photographs by R.L. Barrett.

R.L. Barrett RLB 8966 (PERTH); 29 Apr. 2008, *R.L. Barrett & M.D. Barrett* RLB 4862 (PERTH); 29 Apr. 2008, *R.L. Barrett & M.D. Barrett* RLB 4864 (PERTH); 29 Apr. 2008, *R.L. Barrett & M.D. Barrett* RLB 4906 (PERTH); 12 Mar. 2014, *G. Bourke per R.L. Barrett* RLB 9001 (PERTH); 14 May 1983, *P.A. Fryxell & L.A. Craven* 4129 (CANB, PERTH); 20 Aug. 1975, *A.S. George* 14087 (CANB, K, PERTH); 7 Mar. 1989, *G.J. Keighery* 10797 (PERTH); 26 June 1973, *P.G. Wilson* 10971 (PERTH).

Phenology. Flowering and fruiting from March to June (rarely August).

Distribution and habitat. Only known from a small area in the far-north Kimberley, from Theda Station and Drysdale River National Park north to Lawley River National Park. This species is restricted to rock overhangs where it commonly grows with *Micraira dunlopii*, *Mitrasacme graminea* and *M. scriithicola*.

Conservation status. *Stylidium saintpaulioides* is to be listed as Priority Three under Department of Parks and Wildlife Conservation Codes for Western Australian Flora (A. Jones pers. comm.).

Etymology. The epithet refers to the genus *Saintpaulia* H.Wendl. (Gesneriaceae) to which this species bears a significant resemblance due to the rosette of broad, dark leaves and display of orange-pink flowers.

Notes. *Stylidium saintpaulioides* is a distinctive species that is probably most closely related to *S. semipartitum*, differing most obviously in having large leaves with cordate bases. It is also related to *S. leptorrhizum* and *S. pindanicum*. The differences between all these species are detailed in the key above, in Table 1 and in Figure 4.

The vernacular name of Saintpaulia Triggerplant is recommended.

Stylidium willingii R.L.Barrett, Kenneally & Lowrie, *sp. nov.*

Type: Sandstone pavement on west side of King Edward River, west-north-west of Theda Station Homestead, Western Australia, 12 March 2014, *R.L. Barrett* RLB 8960 (*holo:* PERTH 08613451; *iso:* BRI, CANB, DNA).

Herbaceous *annual*, 8–44 cm high, with *stems* contracted or to 5 cm long, base not thickened. Glandular *hairs* 0.05–0.1 mm long; glands globose, red to reddish black. *Leaves* 5–9 per plant, arranged in a flat basal rosette or a few scattered on the stem, sessile or with petioles up to 5.5 mm long, obovate, 7–26(–40) mm long excluding petiole, 5–16 mm wide, flat in section, glabrous; apex obtuse; base obtuse to cuneate; margin entire. *Scapes* 1–4 per plant, 8–47 cm long, 0.5–0.7 mm in diam., sparsely glandular-hairy; sterile bracts absent. *Inflorescences* determinate, branches monochasially cymose, glandular-hairy; bracts linear or lanceolate, 0.9–2.1 mm long, glandular-hairy, apex acute; bracteoles absent; pedicels absent. *Hypanthium* linear, (3–)9–12 mm long, 0.3–0.4 mm wide, glandular-hairy throughout. *Sepals* with 3 free and 2 fused to the apex, linear to oblanceolate, 1.4–1.5 mm long, 0.25–0.50 mm wide, glandular-hairy, apex obtuse. *Corolla* tube 1.7–1.9 mm long, with sinus on anterior side only, glandular-hairy; *lobes* all free to the tube, pale pink on face, cream with red veins on reverse, vertically paired, glabrous; anterior (upper) lobes 1.0–1.1 mm long, 0.5–0.6 mm wide, entire, apex obtuse; posterior (lower) lobes 1.6–2.0 mm long, 1.2–1.4 mm wide, apex obtuse and slightly notched. *Paracorolla* continuous, thin, glabrous, 0.1 or 0.2 mm high, with 6 lobes; 4 lobes at the base of the posterior lobes small, yellow, obtuse or acute; 2 lobes at the base of the anterior lobes larger, yellow and reddish pink; glands absent. *Labellum* attached to outside of corolla tube below sinus, off-white,

ovate or lanceolate, 0.5–0.6 mm long, 0.2–0.3 mm wide, thick, acuminate, glabrous with terminal appendage to 0.05 mm long. *Column* 4.5–6.9 mm long, mostly of uniform width, glabrous; with lateral lobes *c.* 0.4 mm wide, forming slender wings on the cunabulum; corona absent; stigma sessile, entire; anthers *c.* 0.6 mm long. *Capsule* linear, 9–12 mm long excluding sepals, 0.3–0.5 mm wide, without raised longitudinal ribs; halves detaching distally, sometimes recurved. *Seeds* reddish brown, ellipsoid to bullet-shaped, 0.16–0.24 mm long, 0.14–0.20 mm wide, finely sculptured. (Figures 4D, 6)

Diagnostic characters. *Corolla* face pale pink, reverse cream with red veins; ring of six paracorolla lobes around the throat. *Corolla lobes* vertically paired, all free to the top of the tube. *Column* 4.5–6.9 mm long; lateral lobes present, *c.* 0.4 mm wide, forming slender wings on the cunabulum.

Other specimens examined. WESTERN AUSTRALIA: Wren Gorge, Edkins Range, 7 July 1993, *M.D. Barrett & R.L. Barrett* MDB 249 (PERTH); Edkins Range, near Drosera Gully, on sand flats north of jump-up, N of Charnley River Crossing, 62 km N of Beverley Springs Station Homestead, 9 July 1994, *R.L. Barrett & M.D. Barrett* RLB 8817 (PERTH); Wren Gorge, Edkins Range, 11 July 1994, *R.L. Barrett & M.D. Barrett* RLB 8820 (PERTH); 3 km W of Kalumburu, 24 May 1993, *I. Cowie 4263 & C. Brubaker* (CANB, DNA *n.v.*, PERTH); King Edward River Crossing, 5 June



Figure 6. *Stylidium willingii*. A – habitat at type locality, B – leafy rosette, C – flower with reflexed column showing small wings on cunabulum, distinct, yellow paracorolla rim and red, lateral paracorolla lobes, D – inflorescence. Images from *R.L. Barrett* RLB 8960. Photographs by R.L. Barrett.

1987, *D.J. Edinger* 276 A (PERTH); King Edward River Crossing, 12 June 1987, *D.J. Edinger* 362 (PERTH); unnamed creek running into Pauline Bay, c. 1 km upstream from tidal influence, 25 May 1984, *S.J. Forbes* 2155 (MEL, PERTH); Blyxa Creek, Prince Regent River Reserve, 19 Aug. 1974, *A.S. George* 12428 (CANB, PERTH); King Edward River Crossing, 10 June 1987, *G.J. Keighery* 9543 (PERTH); King Edward River Crossing, 24 June 1993, *A. Lowrie* 768 (PERTH); Kalumburu, Sep. 1968, *F. Lullfitz* 6052 (PERTH); Morgan River, near old Theda Homestead, 28 July 1977, *I.R. Telford* 6204 (CANB, PERTH).

Phenology. Flowering and fruiting recorded from March to August.

Distribution and habitat. Known from the North Kimberley, from the Edkins Range north to the King Edward River and Kalumburu. Grows in damp sandy areas, often in creeks and gorges on sandstone. This species grows among thick grasses and herbs that often obscure its presence, with just the flowers showing at the top of the grass layer.

Conservation status. *Stylidium willingii* is reasonably widespread in the Kimberley and is not currently considered to be threatened.

Etymology. This species is named in honour of Tim Willing, a long-time resident of Broome, in recognition of his outstanding contribution to the understanding of the Kimberley flora through his formidable collecting efforts, his encyclopaedic knowledge of tropical horticulture and his collaborative approach to sharing botanical knowledge.

Notes. *Stylidium willingii* appears to have affinities with *S. lobuliflorum* F.Muell., *S. pachyrrhizum* F.Muell. and *S. schizanthum* F.Muell. It resembles all of these species in having a small, basal leaf rosette and small throat appendages (the upper two being bright pink-red), but it lacks a true paracorolla gland. It may also have affinities with *S. accedens* A.R.Bean which looks superficially similar and sometimes has six small throat appendages, but has distinctly notched anterior corolla lobes. *Stylidium willingii* is readily distinguished from all of these species by its posterior corolla lobes, which are free to the tube and not fused at the base, and the presence of wing-like appendages on the cunabulum. This latter feature may ally it to the *S. muscicola* F.Muell. species complex, from which *S. willingii* is readily distinguished by its basal rosette and contracted stem (members of the *S. muscicola* species complex have a terminal rosette on an elongated stem).

The vernacular name of Willing's Triggerplant is recommended.

The key provided by Bean (2000) can be adapted to include *S. willingii* by modifying and adding the following couplets:

- | | |
|---|---------------------|
| 22. Petals all free [A1+A2+P1+P2]..... | 22A |
| 22: Posterior petals fused [A1+A2+(P1&P2)] | 24 |
| 22A. Column 4.5–6.9 mm long, lateral lobes present; no sterile bracts on scape..... | S. willingii |
| 22A: Column 2.5–3.5 mm long, lateral lobes absent; sterile bracts usually present on scape..... | 23 |

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